

EXECUTIVE SUMMARY

INTRODUCTION

The California Department of Water Resources (DWR) is the owner and operator of the Oroville Facilities¹, a multipurpose water supply, flood control, power generation, recreation, fish and wildlife, and salinity control project. The facilities operate under a license from the Federal Energy Regulatory Commission (FERC, or the Commission). The license for the facilities expires on January 31, 2007. Pursuant to the Federal Power Act, DWR is required to file an application for a new license (relicense) on or before January 31, 2005.

This document is an Initial Information Package (IIP) and was prepared to provide information about the facilities and their operation, the environment affected by the project, and resource issues and potential studies for the preparation of the license application. DWR has submitted a request to the FERC to use the Alternative Licensing Procedures (ALP) in relicensing the Oroville Facilities. The Commission approved DWR's request on January 11, 2001. The ALP enables the relicensing participants to tailor the relicensing process to address specific issues and streamline procedural compliance with multiple federal and state laws. DWR plans to develop an Applicant Prepared Environmental Assessment (APEA) to meet the requirements of the National Environmental Policy Act (NEPA), FERC's relicensing regulations, and the California Environment Quality Act (CEQA).

DWR is proposing a three-tiered process to achieve consensus on relicensing. The three tiers include a Plenary Group, Work Groups, and Task Forces. For those not interested in actively participating in the relicensing process, several options are available for staying involved, including review of DWR's website (<http://orovillerelicensing.water.ca.gov>), providing comments via a toll free number (866-820-8198) or e-mail address (orovillep2100@water.ca.gov), or reviewing DWR's quarterly newsletter. Public comments will also be solicited during the process. (See Figure 1-2 for the draft relicensing schedule.)

¹ For purposes of this document, the term "Oroville Facilities," refers to elements of the State Water Project, Oroville Division, identified in Federal Energy Regulatory Commission License Project No. 2100.

PROJECT DESCRIPTION

The Oroville Facilities are located on the Feather River in the foothills of the Sierra Nevada in Butte County, California (see Figure 1-1). The Oroville Facilities encompass 41,100 acres within the project boundary and include Lake Oroville (the state's second largest reservoir), Oroville Dam, three powerplants (Edward Hyatt Powerplant, Thermalito Diversion Dam Powerplant, and Thermalito Pumping-Generating Plant), Thermalito Diversion Dam, the Feather River Fish Hatchery and Fish Barrier Dam, Thermalito Power Canal, Thermalito Forebay and Forebay Dam, and the Thermalito Afterbay and Afterbay Dam, as well as a number of recreational facilities (see Figure 2-1). The 770-foot high Oroville Dam is the highest earthfill dam in the United States. The Dam is five miles east of the City of Oroville and about 130 miles northeast of San Francisco. The Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5 million-acre-feet (maf) capacity storage reservoir with a surface area of 15,810 acres at its normal maximum operating level.

Located at Oroville Dam, the Edward Hyatt Powerplant is the largest of the three powerplants with a capacity of 645 MW. Water from the six-unit underground powerplant (three conventional generating and three pumping-generating units) is discharged through two tunnels into the Feather River just downstream from Oroville Dam. Four miles downstream of the Oroville Dam is the Thermalito Diversion Dam, which creates a tailwater pool for the Edward Hyatt Powerplant and is used to divert water to the Thermalito Power Canal. The Thermalito Diversion Dam Powerplant is a three MW powerplant located on the left abutment of the Diversion Dam. The powerplant releases a maximum of 615 cubic feet per second (cfs) of water to the river. The Power Canal is a 10,000 foot-long canal designed to convey both generating flows of 16,900 cfs to the Thermalito Forebay and pumping flows of 9,000 cfs to the Edward Hyatt Powerplant. The Thermalito Forebay is an off-stream regulating reservoir for the 114 MW Thermalito Pumping-Generating Plant. The Thermalito Pumping-Generating Plant has a generating and pumping capacity of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into the Thermalito Afterbay, which is contained by a 42,000 foot-long earthfill dam. The Afterbay is used to release water into the Feather River downstream from the Oroville Facilities, serves as a warming basin for agricultural water, helps regulate the power system, provides storage for pump-back operations, and provides recreational opportunities. Several local irrigation districts also divert water from the Afterbay.

The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low flow channel of the Feather River between the dam and the Afterbay Outlet, and provides attraction flow for the hatchery. The hatchery compensates for spawning grounds lost to returning salmon and steelhead trout from the construction of Oroville Dam. The hatchery can accommodate an average of 8,000 adult fish annually.

PROJECT OPERATION

The DWR stores winter and spring runoff in Lake Oroville for release to the Feather River, as necessary for project purposes (water supply, power generation, flood protection, fish and wildlife enhancement, and recreation). Typically, power is generated when water releases are being made for these other purposes, when deliveries are being made to local irrigation districts through the Afterbay, or when pump-back operations are in effect. Annual operations planning is conducted for multi-year carry over, in which half the Lake Oroville storage above the minimum pool is assumed available for subsequent years. The operations plan is updated regularly to reflect changes in hydrology and downstream operations. Typically, Lake Oroville is filled to its maximum annual level of up to 900 feet mean sea level (msl) in June and then can be lowered as necessary to meet downstream requirements, to its minimum level in December or January. During drier years, the lake may be drawn down more and may not fill to the desired levels the following spring. During 1991, 1992, and 1993, the minimum elevations were 651 feet, 702 feet, and 723 feet, respectively. During wetter conditions, Lake Oroville is managed to control downstream flooding. The U.S. Army Corps of Engineers (USACE) requires Lake Oroville to be operated to maintain up to 750,000 acre-feet (AF) of storage to capture significant inflows for flood control. Historically, the maximum flood flows released from Lake Oroville were 167,000 cfs in 1997.

On a weekly basis, releases are scheduled to accommodate water supply requirements, water quality and quantity requirements in the Sacramento-San Joaquin Delta, instream flow requirements in the Feather River, power requirements, and minimum flood control space. The weekly plan is updated as needed to respond to changing conditions. The Thermalito Dam Pool and the Thermalito Forebay and Afterbay are too small for seasonal storage so they are used only in weekly and daily operations planning. Hourly releases through the Edward Hyatt and Thermalito Pumping-Generating plants are

scheduled on an hourly basis to maximize the amount of energy produced when power values are highest. Because the downstream water supply is not dependent on hourly releases and pumping of State Water Project (SWP) water can be scheduled at off-peak times, hourly operations are primarily dictated by electrical energy prices and ancillary service requirements such as spinning reserve, the supplemental energy market, and voltage regulation. Storage in the Thermalito Forebay and Afterbay is used to maximize the value of project energy and maintain uniform flows in the Feather River downstream of the Oroville Facilities. The Thermalito Afterbay also provides storage for pump-back operations. The pump-back operations are designed to use water in excess of what is required for downstream flow requirements for pumping back into the Thermalito Forebay and then into Lake Oroville in off-peak energy hours for re-release during peak hours when power rates again increase. Because the powerplants are operated to maximize weekday generation when power prices are highest, there is usually higher storage in the Afterbay by the end of the week. During the weekend, water from the Afterbay continues to be released to the Feather River, generation at the Hyatt/Thermalito plants is decreased, and pump back into Lake Oroville may occur. By the end of the weekend, the elevation of the Afterbay is lowered to prepare for a similar operation the following week.

Flows in the low flow channel just below the Thermalito Diversion Dam are maintained at a minimum of 600 cfs for fishery purposes, mainly by passing the flow through the 3-MW Thermalito Diversion Dam Powerplant. Flows in the Feather River are further augmented at the Thermalito Afterbay to meet downstream flow requirements and water supply needs. Generally, the downstream flow requirements are 1,700 cfs below Thermalito Afterbay from October to March, and 1,000 cfs from April to September. However, if runoff for the previous April through July period is less than 1,942,000 AF (i.e., the 1911-1960 mean unimpaired runoff near Oroville), the minimum flow can be reduced to 1,200 cfs. A maximum flow of 2,500 cfs is maintained from October 15 through November 30 to prevent spawning in overbank areas that might become de-watered.

In addition to flow requirements, the project is operated to meet water temperature objectives for the Feather River Fish Hatchery water supply and for the Feather River downstream of the Thermalito Afterbay Outlet. The hatchery objectives are 52°F for September, 51°F for October and November, 55°F for December through March, 51°F for April through May 15, 55°F for last half of May, 56°F for June 1-15, 60°F for June 16

through August 15, and 58°F for August 16-31. A temperature range of plus or minus 4F° is allowed for April through November objectives.

The objectives for the Feather River downriver of the Afterbay Outlet are a narrative. During the fall months, after September 15 the temperatures must be suitable for fall-run chinook. From May through August, they must be suitable for shad, striped bass, and other warmwater fish. Water temperatures are met through a shutter controlled intake gate system at the Oroville Dam that allows DWR to select water for release from various reservoir depths.

The water temperature objectives sometimes conflict with temperatures desired by agricultural diverters. Rice farmers desire water temperatures of 65°F from approximately April through mid-May, and 59°F during the remainder of the growing season. DWR is now trying to accommodate these needs by releasing water at the higher end of the temperature range required for the hatchery.

DWR is not proposing operational changes at this time, but changes may be implemented as a result of the relicensing process.

AFFECTED ENVIRONMENT

Feather River Watershed

The Oroville Facilities, located on the Feather River, a major tributary to the Sacramento River (see Figure 4-1), provide about 25 percent of the flow in the Sacramento River as measured at Oroville Dam. The Feather River watershed is approximately 3,600 square miles at Oroville Dam. The upper portion of the watershed is rugged and mountainous, while the central third consists of broad alluvial valleys separated by high, steep peaks and ridges. The eastern third consists of long broad meadow systems separated by relatively low ridges.

The North, South, and Middle Forks of the Feather River are the primary tributaries to the reservoir. About half of the flow into the reservoir comes from the North Fork. Two major tributaries join the Feather River downstream of the project. The Yuba River enters the Feather River 39 river miles downstream of Oroville, and the confluence with the Bear River is 16 miles farther downstream. The Feather River joins the Sacramento River about 67 miles downstream of Oroville.

Water Quantity and Use

The average annual unimpaired flow of the Feather River at Oroville is 5,800 cfs (4.2 maf). Much of the runoff occurs in the January through June period. Summer inflows are sustained at about 1,000 cfs because of snowmelt and groundwater inflow from the high-elevation watersheds. Due to several small diversions upstream, actual inflow into Lake Oroville is about 4.0 maf. Annual flows are variable and depend upon annual precipitation. From 1979 to 1999, annual inflows have ranged from a minimum of 1.7 maf to as high as 10 maf. Outflow from the project typically varies from spring seasonal highs to about 3,500 cfs in November. Although the Edward Hyatt and Thermalito Pumping-Generating Plants operate in a peaking mode, flows in the Feather River are held relatively constant via the Thermalito Afterbay Outlet works.

Monthly irrigation diversions of up to 150,000 AF are now made from the Thermalito Complex during the May through August irrigation season. Annual diversions are slightly less than 1 maf, leaving about 3 maf for flow in the Feather River downstream of the project. Discharges into the lower Feather River continue into the Sacramento River and into the Sacramento-San Joaquin Delta. At the north end of the Delta, the water is pumped into the North Bay Aqueduct. In the south Delta, water is diverted into Clifton Court Forebay where the water is stored until it is pumped into the California Aqueduct. Additionally, flows through the Delta are maintained to meet Bay-Delta water quality standards.

Geology and Soils

The Feather River watershed is comprised of a diversity of rock types: granitic, volcanic, metamorphic, and sedimentary. Under present land use conditions, many of the headwater streams in the watershed have formed sharp, V-shaped channels devoid of vegetation. These channels are easily eroded. In the lower two-thirds of the basin, flows are confined in deeply incised canyons with little or no floodplain. The floodplain downstream of Oroville Dam is covered by coarse debris from hydraulic mining and mounded remains of dredged tailings.

Historically, landslides have been a source of sediment to the river. Parts of the watershed produce high sediment yields, accelerated by human activity. However, the construction of Lake Almanor in 1913 and several Pacific Gas and Electric hydroelectric projects upstream of Lake Oroville has reduced sediment inflow to the lake. DWR

estimates that about 18,000 AF of sediment has accumulated in Lake Oroville since its construction and has not significantly impacted its operation.

Sediment-free flow below the dam has scoured the river channel immediately downstream from the dam. The resulting substrate is armored by boulders and cobbles. This is particularly true in the low flow channel downstream of the Fish Barrier Dam. Farther downriver, the channel bed and banks become more variable as the river begins to flow through undisturbed older alluvium and floodplain deposits.

The seismicity at Oroville has been characterized as one of low-to-moderate magnitude earthquakes at relatively long recurrence intervals, occasionally resulting in minor ground rupture and offset.

Water Quality

Water quality data collected in the North, Middle, and South Forks of the Feather River indicate that dissolved oxygen (DO), pH, conductivity, temperature, and turbidity levels have generally been within established goals and criteria. There are a few exceptions to this. During the fall and early winter, conductivity in the Middle Fork has exceeded the Basin Plan Goal of 150 $\mu\text{mhos/cm}$. Turbidity has usually been low, but a water sample in 1996 produced turbidity values as high as 60 nephelometric turbidity units (NTU) in both the North and Middle Forks, and another sample in winter 1997 contained elevated levels of 35 NTU in the North Fork. The high turbidity levels were associated with high flows. In comparison to other water bodies, nutrients in the Feather River are at low levels. A few metals in the upper Feather River occasionally exceeded criteria for beneficial uses. These were: cadmium, which exceeded the National Toxics Rule (NTR) criterion in all three forks; total iron in the North and Middle Forks, which exceeded the agricultural goal in one sample in 1996; and lead from one sample in spring 1992, which exceeded the NTR and another in the South Fork in 1996. More recent analyses for arsenic have exceeded the NTR criteria in the North and Middle Forks.

Lake Oroville is typical of many other deep, steep-sided California foothill reservoirs with large surface fluctuations and a low surface-to-volume ratio. Water temperatures in Lake Oroville during the winter are generally uniform at about 45°F. Stratification begins in April and continues into the fall, with surface temperatures warming to a

maximum of about 75°F in August. Water temperatures at the lower depths remain at about 50°F during the summer and gradually decrease through the fall.

Turbidity levels in the lake are typically low but can be high during the spring runoff period. During the spring, summer, and fall, turbidity levels are low near the surface. At deeper levels of 167 feet, turbidity levels as high as 22 NTU were measured. Dissolved oxygen, pH, conductivity, and metals concentrations are satisfactory and comply with Basin Plan Objectives developed to protect beneficial uses. Nutrients in the lake have generally been low, but total phosphorus concentrations were occasionally found at higher levels. MTBE, a gasoline additive, has been detected in the lake, but the concentration decreases rapidly after the boating season.

Water quality in the lower Feather River has generally been well within the goals of the Basin Plan for the protection of beneficial uses. Water temperatures are lower in the spring and summer than during pre-project flow conditions. Similarly, minimum annual water temperatures are higher than those experienced during pre-project conditions. Maximum water temperatures in the lower Feather River have been about 63°F. Nutrients and minerals in the lower Feather River are low. However, several metals have exceeded various criteria. Arsenic has exceeded U.S. Environmental Protection Agency (EPA) NTR criterion for continuous concentration. Cadmium and copper have also been found to occasionally exceed the NTR criterion for continuous concentration.

Water quality parameters in the Thermalito Forebay and Afterbay generally reflect the Lake Oroville parameters. Typically, daily water temperatures in the Afterbay since 1995 have been in the upper 50°F range.

Aquatic Resources

The reservoir and lower Feather River fisheries are regionally important for both coldwater and warmwater species. In Lake Oroville, the bass fishery is particularly important to the local economy as it supports bass tournaments almost every weekend. The Lake Oroville coldwater fishery is primarily comprised of chinook salmon and brown trout, although rainbow and lake trout are periodically caught. The coldwater fishery is sustained by hatchery stocking because natural recruitment in the lake is very low. This fishery is managed to produce trophy salmonids and to provide a quality fishery characterized by high salmonid catch rates. Chinook are the primary coldwater fish stocked in the lake, but brown trout are also stocked. Rainbow trout are no longer

stocked partly because *Ceratomyxa shasta*, a myxozoan parasite lethal to most strains of rainbow trout, is prevalent in the lake. DWR and DFG are also reviewing the salmonid stocking plan to determine what, if any, adjustments might be made to address other disease concerns in Lake Oroville and the Feather River Fish Hatchery.

The warmwater fishery is comprised of four species of black bass, two species of catfish, two species of sunfish, and two species of crappie. Spotted and largemouth bass are the most prevalent. Because of the lack of cover in the lake, attributed to large water level fluctuations, steep slopes, and poor soils, standing crops of centrarchid species are reduced. DWR has recently completed a six-year Habitat Improvement Plan that targets the warmwater fishery and juvenile black bass in particular. Catfish are also a popular fish to catch in the spring and summer. Primary forage fish in the lake are wakasagi and threadfin shad.

The Thermalito Diversion Pool is dominated by coldwater fish, including rainbow trout, brook trout, brown trout, and chinook salmon because of the cold water released from Lake Oroville. Salmon stocked in the Thermalito Forebay are free to move into the Diversion Pool since there is no barrier between the water bodies. Several trophy salmonids are caught in the Diversion Pool annually because of the relatively abundant supply of forage fish entering the pool from Lake Oroville.

The Thermalito Forebay is managed as a put-and-take trout fishery, where catchable rainbow and brook trout are stocked biweekly. The Forebay coldwater fishery is the second most popular reservoir fishery at Oroville. The diverse temperature structure of the Thermalito Afterbay has suitable habitat for both coldwater and warmwater fish. Salmonids present here likely have passed through the Thermalito Pumping-Generating Plant.

The Feather River Fish Hatchery is one of the best chinook salmon hatcheries on the west coast, making substantial contributions to both commercial and recreational fisheries. The hatchery mitigates for the loss of chinook salmon and steelhead trout from construction of the Oroville Facilities.

The lower Feather River is comprised of the eight-mile long low flow channel and 14 miles of the lower Feather River downstream of the Thermalito Afterbay outlet. Some

areas of the low flow channel are armored due to the absence of gravel recruitment, but there are nine major riffles with suitable spawning size gravel. Flow in the low flow channel is regulated at 600 cfs, except during flood flow releases from Oroville Dam. Flow below the Afterbay Outlet typically is steady and ranges from 1,750 cfs in the fall to 17,000 cfs in the spring.

The lower Feather River supports a variety of anadromous and resident fish species, with chinook salmon and steelhead the most important from a sport fishing perspective. Angler harvest rates for chinook salmon were 18,000 and 26,000 in 1998 and 1999, respectively, but annual estimates from ocean catch of fall-run chinook from the Feather River ranged between 40,000 and 90,000 between 1975 and 1984, making it an important fishery. Other important species in the lower Feather River include striped bass and American shad. The Thermalito Afterbay Outlet is the most popular fishing spot in Butte County, hosting tens of thousands of anglers annually.

The Oroville Wildlife Area contains over 75 warmwater ponds and sloughs that support abundant populations of largemouth bass, channel catfish, white catfish, bluegill, green sunfish, and carp.

Botanical Resources

Within the project boundary there are about 20,000 acres of native vegetation, developed areas, and other disturbed areas. Significant areas of native vegetation occur within the areas surrounding Lake Oroville and in the lower elevations associated with the Forebay and Afterbay. The U.S. Forest Service and Bureau of Land Management manage about 4,000 acres of the terrestrial lands.

In general, vegetation types within the project boundary are dominated by chaparral shrubs/woodland types or grassland/riparian types. In the vicinity of Lake Oroville and the Thermalito Diversion Pool, the dominant vegetation types are tree series (oak series and conifer series) and shrub series. These vegetation types are not considered rare, but they do provide habitat for a number of the sensitive plant species of the region.

Some of the lower elevations of the project area are dominated by the California annual grassland series, with some of these areas having spectacular wildflower displays in the spring. Ephemeral wetlands of the sedge and spikerush series and northern hardpan vernal pools are present throughout these lower elevation grasslands. While common in

the project area, vernal pool habitat is considered rare in the sense that much of the habitat has been eliminated on a state-wide basis. The vernal pools provide habitat for a number of federally listed invertebrate and plant species, including the endangered fairy shrimp.

There are no records of federally listed endangered or threatened plant species within the Oroville Facilities project area. However, four federally listed plant species do occur near the project. Twenty plant species are listed as federal Species of Concern within or adjacent to the project boundary.

A number of plant species considered noxious weeds occur near or within the project area. Four of these species are high priority target species: purple loosestrife, giant reed, yellow starthistle, and parrot's feather. There are a number of ongoing control/eradication projects for these species.

Several culturally important plant species also occur within the project area. Important plant foods include pines, oaks, buckeye, cattail, hazelnut, and berries.

Riparian vegetation along the lower Feather River is fairly restricted or absent in many areas. The most extensive zones are found within the Oroville Wildlife Area and south of Marysville.

Wildlife Resources

The diversity of wildlife habitats within and adjacent to the project area support a variety of wildlife species, including numerous recreational/commercial species and special status species. Five land management agencies manage the wildlife habitat within the project area. Wildlife habitat types within the project area are dominated by lacustrine (ponds and lakes), blue oak/foothill pine, and valley foothill riparian.

A variety of commercially or recreationally important wildlife species occur, including black-tailed deer, waterfowl, and upland game species (e.g., mourning dove, wild turkey, pheasant, and quail). The deer population declined in the 1960s through the early 1980s, with rural residential growth considered the major limiting factor. Waterfowl are the most important commercial and recreational group of wildlife in the lower elevation portions of Butte County. Portions of the Oroville Wildlife Area within the project

boundary are managed by the DFG to provide habitat for nesting and wintering waterfowl.

Fifteen state or federally listed species (including candidate species) may occur within the project area. Seven of these (Aleutian Canada goose, bank swallow, Swainson's hawk, western yellow-billed cuckoo, California red-legged frog, giant garter snake, and vernal pool fairy shrimp) have been documented in the project vicinity. Limited amounts of habitat exist for each of these seven species.

Cultural Resources

Human occupation of the northern Sacramento valley may span 10,000 years or more. Much of the recorded prehistory of the area is due to the intensive archeological investigations that were conducted along the Feather River in association with construction of Oroville Dam. The cultural sequence of the area is divided into four phases that span 1000 BC to 1850 AD: Mesila, Bidwell, Sweetwater, and Oroville.

The project area is located in the ethnographic territory of the Konkow Indians, also known as the Northwestern Maidu. Within the Lake Oroville area, all the prehistoric archaeological periods are represented. Several archaeological studies have been conducted in the project area. Hines (1987) conducted an analysis of archaeological sites and concluded that there were 196 sites in the project area, with 127 sites seasonally exposed during low pool elevations or completely above the inundation zone (i.e., 78 sites in the fluctuation zone between elevation 640 and 900 feet and 49 sites above the high pool elevation). Including surveys conducted since then, a revised total of 173 sites are now completely or periodically accessible.

The settlement of Oroville by Europeans began when gold was discovered at the site in 1849. By 1856 Oroville was the fifth largest town in California. When the surface gold diggings were largely exhausted, Oroville went into a period of economic and demographic decline. Grain growing in the 1860s and citrus and olive production in the late 19th century became especially important. In the 1890s, mining again became important with the development of river dredging. By 1930, dredging companies had moved out of the area. The huge tailings of rock and boulders from the dredging operations were used in the construction of Oroville Dam; however, dredge spoils are still evident in the project area near the Thermalito Facilities and the Oroville Wildlife Management Area.

Several historic properties associated with Lake Oroville have qualified for local, state, and federal recognition. Notable historical objects include the Bidwell Bar Bridge, Old Toll House, and Mother Orange Tree. However, no historic properties at Lake Oroville have been determined eligible or are listed on the National Register of Historic Places (NRHP).

In the lower Feather River area, archaeological sites indicate intensive occupation over a long time period; deep, stratified, multi-component midden deposits denote village settlements, with associated cemeteries, structural depressions, and milling stations. The Table Mountain Boulevard Bridge is the only resource within the lower Feather River project area listed in the NRHP. Additionally, 20 sites that have been recorded are still thought to exist in the lower Feather River project area.

Recreational Resources

There are a number of recreational opportunities within a one to two hour drive of Oroville and within the project vicinity including Plumas National Forest, Highway 70 Scenic Byway, Feather Falls Scenic Area, and the North Fork Feather River Hydroelectric Projects. Existing facilities at the Oroville Complex host a variety of recreational opportunities including boating, fishing, camping, picnicking, swimming, horseback riding, hiking, bicycling, wildlife viewing, and hunting. The major recreation facilities include the Lake Oroville Visitor Center, Loafer Creek Recreation Area, Lime Saddle Recreation Area, Lime Saddle and Bidwell Canyon Marinas, Freeman Bicycle Trail, Lake Oroville Horse Trail, Oroville Wildlife Area, and the North Thermalito Forebay Recreation Area. Recreation opportunities are also available at the South Thermalito Forebay, Thermalito Afterbay, the Diversion Pool, and the low flow channel of the Feather River.

Lake Oroville provides many year-round recreation opportunities, but these opportunities can be affected by lake levels. As the water levels decrease during the recreation season, the use of certain recreational facilities such as boat launch ramps, car-top boat launches, and boat-in camps is increasingly affected. Low water also impairs boat access to some recreation sites such as the spectacular Feather Falls.

Recreation use at the Lake Oroville State Recreation Area (LOSRA) was estimated at one million visitors in 1997, with boating the primary activity of most visitors. Boat fishing, water skiing, and pleasure boating are the three activities visitors stated most often as their primary activity. Based on a survey, visitors enjoyed their experience.

Socioeconomics

Socioeconomic activity generated by recreational use of the Oroville Facilities is concentrated within Butte County. Recreation and tourism-related travel expenditures in the county generated an estimated 3,300 jobs in 1998, and an estimated \$47.1 million in payroll expenditures, representing 1.2 percent of income within Butte County. With a per capita income of about \$20,840 the county is ranked 37th among California's 52 counties. Based on the one million visitors in 1997, recreation visitation generated about \$5.7 million in local expenditures, with much of the spending generated by persons within Butte County.

At the local level, unemployment in the Oroville area was generally higher than the countywide rate in 1999, with an estimated unemployment rate of 9.7 percent in the City of Oroville. Based on the higher unemployment rates, per capita incomes in the Oroville and Thermalito areas are likely lower than the countywide per capita income. Approximately 52 percent of the \$5.7 million in expenditures from the LOSRA visitation is associated with visits at the southern end of LOSRA near Oroville.

Land Use and Management

The vast majority of land use in the region surrounding the project boundary is used for agriculture, timber, and grazing. Similar to the larger region, most of the lands surrounding Lake Oroville consist of undeveloped forest, brush, and grazing lands. The only area in proximity to the lake's edge with urban or suburban development is on Kelly Ridge, which is east of the dam. At the north end of the lake, several small areas along the North and Middle Forks of the Feather River lie within the Plumas National Forest and are subject to the provisions of the Plumas Forest Plan.

Both the Forest Service and the U.S. Bureau of Land Management (BLM) manage federal lands within the project boundary. BLM properties total about 6,300 acres. Most of the land within the project boundary is managed at the state level, with the state Department of Parks and Recreation (DPR) managing recreation use of project area lands, primarily under fee title ownership of the DWR. The DFG manages the Oroville

Wildlife Area. No privately owned lands exist in the project area, but there are privately run marinas and campgrounds along the shoreline. These facilities are under contract with the state.

The project area is primarily managed through seven land and resource management plans. In general, these plans emphasize resource conservation, provision of high quality recreational opportunities, and protection of visual resources. The LOSRA Resource Management and General Development Plan describes allowable recreational uses and intensities for various areas around the lake. The DPR manages shoreline areas in accordance with this plan.

Aesthetics

The development of the Oroville Facilities represented a significant engineering and construction achievement. Because of the scale of the project, the dams, reservoirs, and related facilities are now among the most visually important elements of the area's landscape. Although the scenery in the foothill region around the facilities is attractive, it is generally of local and regional importance, not state or national importance. A notable exception is the Middle Fork arm upstream of the lake, which is designated a Wild and Scenic River. In addition, this area is the site of several waterfalls, including Feather Falls on the Falls River.

Lake Oroville is visible from many locations. It is most attractive when it is at its maximum operating level. As drawdown occurs during the summer and fall, an increasingly broad ring of shoreline appears in the area between the normal high water mark and the actual lake level. The drawdown zone contrasts with the vegetated areas above the high water level and with the lake's surface. As a consequence of reservoir operations, the lake's appearance tends to be very good in late spring and early summer, but declines in July and August with increasing drawdown.

RESOURCE ISSUES AND CURRENT AND PROPOSED STUDIES

DWR is currently conducting studies based on existing requirements that may apply to relicensing needs. DWR anticipates that these studies may be modified and adapted for relicensing requirements based on discussions at the Work Group level. DWR also has preliminarily identified relicensing issues, and has recently initiated discussions at the Work Group and Plenary Group levels to develop the issues and study plans. Therefore,

the issues and studies described below must be considered preliminary in nature. The studies focus on the evaluation of the effects of the project on environmental resources.

Water Quality

Water temperatures are an issue of concern for both aquatic resources and agricultural interests. Temperature monitoring is ongoing, and plans are to examine how specific water releases and operations will affect temperatures in the river, Afterbay, and hatchery.

Aquatic Resources

Several fish hatchery issues need resolution, such as the relationship between the hatchery and restoration of a natural ecosystem, straying and genetic impacts, harvest rates, and disease.

Ongoing studies in the lower Feather River include adult and juvenile steelhead snorkel surveys and a habitat inventory, beach seine surveys to determine the temporal and spatial rearing extent of juvenile steelhead and salmon, rotary screw trap sampling of chinook salmon to monitor the timing and number of emigrants, chinook egg survival studies, particularly in the low flow channel, chinook spawning escapement surveys, redd de-watering and juvenile surveys in the Lower Reach, effects of water temperatures on juvenile steelhead rearing, steelhead creel surveys to gather adult steelhead life history data, and invertebrate research.

Terrestrial Resources

DWR anticipates conducting studies on sensitive species occurrence and distribution within the project area, developing a vegetation/habitat map, and collecting information on recreational wildlife use within the Oroville Wildlife Area and State Park lands.

Cultural Resources

DWR plans to inventory archaeological, historical, and traditional cultural resources, and evaluate their eligibility for listing in the National Register of Historic Places. Further, the project effects on any historic properties would be documented and measures to avoid impacts implemented. The Cultural Resources work would include a Stage I Survey and possibly a Stage II survey as well. The objective of the studies would be to develop a Cultural Resources Management Plan.

Recreational Resources

The major recreation issue is what types and level of recreation facilities would be needed to accommodate additional recreation demand at the LOSRA. Recreational resource studies would be needed to address this issue. The studies may include: recreation supply analysis, recreation surveys, demand analysis, capacity and suitability analysis, needs analysis, and a Recreation Resources Management Plan. These studies would be used in developing an overall recreation plan for the LOSRA.

Socioeconomic Resources

One of the key socioeconomic issues is to develop an understanding of how the recreation activity affects the local and regional economy. Another issue is the potential economic benefits from using Lake Oroville water for municipal, agricultural, and industrial purposes. DWR is proposing several baseline studies to address these socioeconomic issues.

Land Management

Primary land management issues are related to the effects of newly developed recreational facilities on adjacent land uses. Other issues are compatibility of new residential development on existing land use and land ownership.

To address the management issues, several baseline studies would be performed including a land use inventory, evaluation of the consistency of existing land uses with regulations and management plans, and identification of the area's natural and sensitive resources.

Aesthetic Resources

An important aesthetic issue is the effect of the exposed shoreline that accompanies reservoir drawdowns. To assess this issue, it may be appropriate to undertake a study to understand the aesthetic consequences of variations in water level fluctuations. The visually important segments of the low flow channel may also warrant study.

This page was left blank intentionally.